

STRUCTURE OF THE MICROCARD (BASIC INSTRUCTIONS)

A02 = How to use the microcard		1	2	3		4
A01 = Structure of microcard				SIS		
B01 = Trouble-shooting chart	-A-	-***X*	X*XXX	XXXXX	XXXXX	*XXXX X
	-B-	-*XXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	C-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	D-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	E-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XX
	F-	XXXXX	XXXXX	XXXXX	XXX	
	G-	XXXXX	XXXXX	XXXX		
	H-					
	J-					
	K-					
	L-					
	M-					
N01 = Service Information	-N-	-*XXXX	XXXXX	XXXXX	XXX	XX XX*
		12345	67890	12345	67890	12345 678
			1		2	

Index

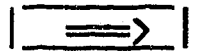
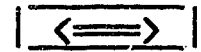
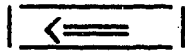

N28 = Table of contents and publication information

- 1 = Special features
- 2 = Safety and precautionary measures
- 3 = Test equipment and tools
- 4 = Installation position of components

- a. Read from left to right.
- b. Title of micropicture (appears on each coordinate).

E16	Product/component/test step	
	Coordinate	

c. Limits of section

			
Beginning	Mid-section	End	One-page section

A01		
-----	--	--

HOW TO USE THE MICROCARD

Trouble-shooting instructions: FOR-511  
System: TI-I

Descriptions, photos, terminal designations and special features refer to the vehicle

Ford Escort XR 3 i, from 11. 86  
with CVH engine.

The basic instructions are detailed trouble-shooting instructions. They must not be used as vehicle-specific instructions.

CAUTION! Descriptions and photos may differ from the brief vehicle-specific instructions. Binding test specifications, terminal assignments and special features should be taken only from the brief vehicle-specific instructions.

For brief instructions, see microcard KFZ-00..

SPECIAL FEATURES

Incorrect indication of engine speed, dwell angle and ignition timing

In ignition systems with trigger box 0 227 100 124 (with current limitation), there may be an incorrect indication of engine speed, dwell angle and ignition timing on testers.

For further details, see Coordinaten N11...N19

A02		
-----	--	--

## SAFETY AND PRECAUTIONARY MEASURES

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to electronic ignition systems being fitted as standard. As a rule, the performance of nearly all makes of electronic systems is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts or terminals are touched (both on the primary as well as the secondary sides).

In this connection, we should like to point out that the VDE regulations, in particular VDE 0104/7.64 and/or the respective national regulations must be observed when testing or working on the ignition system.

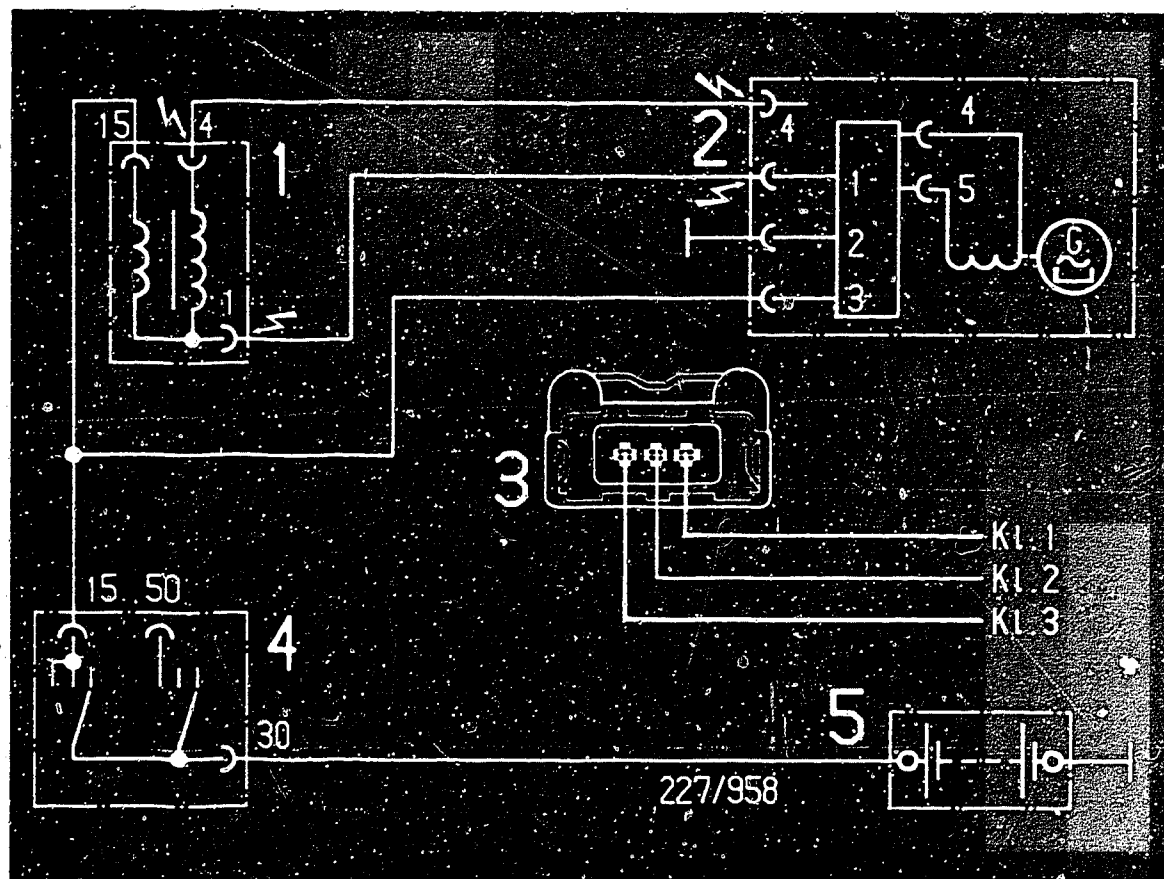
The ignition system should always be switched off when working on the ignition system. (Switch off ignition or voltage source). Such work includes:

- \* Connecting of engine test equipment (timing strobe, dwell-tach tester, ignition oscilloscope, etc.).
- \* Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, H.T. ignition cables, etc.).

## Safety and precautionary measures (continued)

If, when testing the ignition system or when performing adjustments on the engine (e.g. mixture-preparation system), it becomes necessary to switch on the ignition (switch on ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

The danger of accident exists, therefore, not only on the individual components of the ignition system (such as ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (such as tachometer connection, diagnostic plug), at plug-in connections and on test equipment.



Danger arrows = dangerous voltages  
(400 V...25 kV)

- 1 = Ignition coil
- 2 = Ignition distributor with trigger box
- 3 = Trigger-box plug
- 4 = Ignition/starting switch
- 5 = Battery

The dangerous locations are identified by danger arrows taking the example of the terminal diagram of an electronic ignition system.

## IMPORTANT VEHICLE INFORMATION

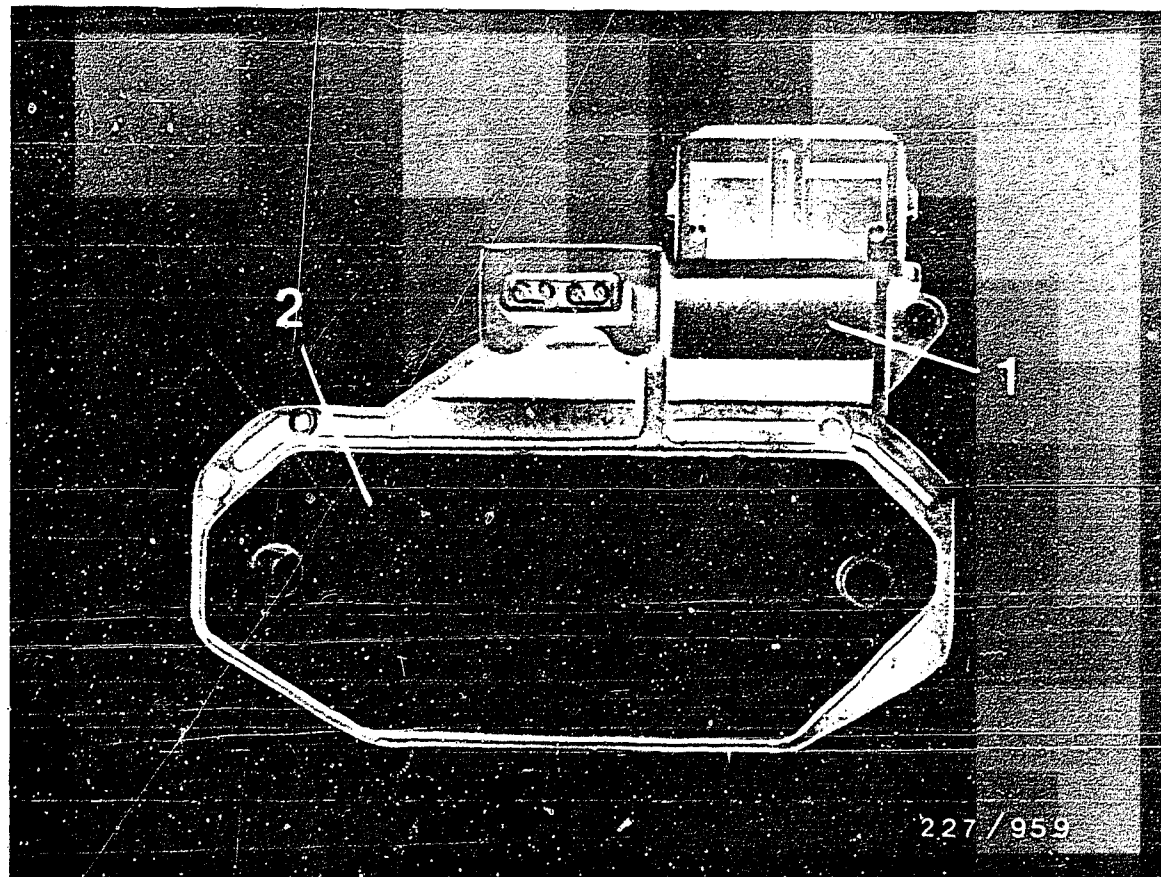
- \* Perform resistance measurements only with the ignition off or with the battery disconnected (measuring instrument defective).
- \* When testing compression, disconnect trigger-box plug or securely ground ignition coil term.4 with auxiliary cable (dangerous high voltage, insulation damage at ignition coil, high-voltage distributor, ignition harness).

### Note :

Auxiliary cable must have at least 2 k  $\Omega$  interference suppression, e.g. sleeve-type suppressor (5 k  $\Omega$ ) 0 356 500 001.

- \* Specified ignition coil (see Part No.) must not be replaced by a different ignition coil.
- \* A suppression capacitor must not be connected to ignition coil term.1.
- \* Ignition coil term.1 must not be grounded as a theft-proofing measure. (With "ignition on", ignition coil will be destroyed)
- \* No battery + and no test lamp may be connected to ignition coil term.1 (trigger box will be destroyed).
- \* Ignition cable between ignition coil term.4 and high-voltage distributor term.4 must not be disconnected during operation.
- \* There must be no arcing between ignition coil term.4 and ignition coil term.1 and term.15. Trigger box may be destroyed.

## SAFETY AND PRECAUTIONARY MEASURES (continued)



1 = Trigger box      2 = Base plate

- \* To prevent irreparable damage to the trigger box, the secondary side of the ignition system must have at least  $2\text{ k}\Omega$  interference suppression, whereby the original distributor rotor with  $1\text{ k}\Omega$  must be installed (even in the case of radio and spark interference suppression, do not use a  $5\text{ k}\Omega$  distributor rotor).
- \* Arcing and insulation breakdown at ignition-distributor cap (poor insulation) may result in destruction of control unit and trigger box.

\* Before mounting on the ignition distributor, coat the base plate of the trigger box (picture) with heat-transfer compound.

\* Apply heat-transfer compound with suitable object (screwdriver, matchstick etc). Do not bring heat-transfer compound into contact with painted parts.

# NECESSARY TEST EQUIPMENT AND AUXILIARIES

Motortester e.g. MOT 201 0 684 000 201

Pulse shaper  
(for measurement of  
primary voltage with  
MOT 201,202,400) 1 684 463 154

Ohmmeter  
or e.g. ETE 014.00 0 684 101 400  
Pontavi WH2 Comm. avail.

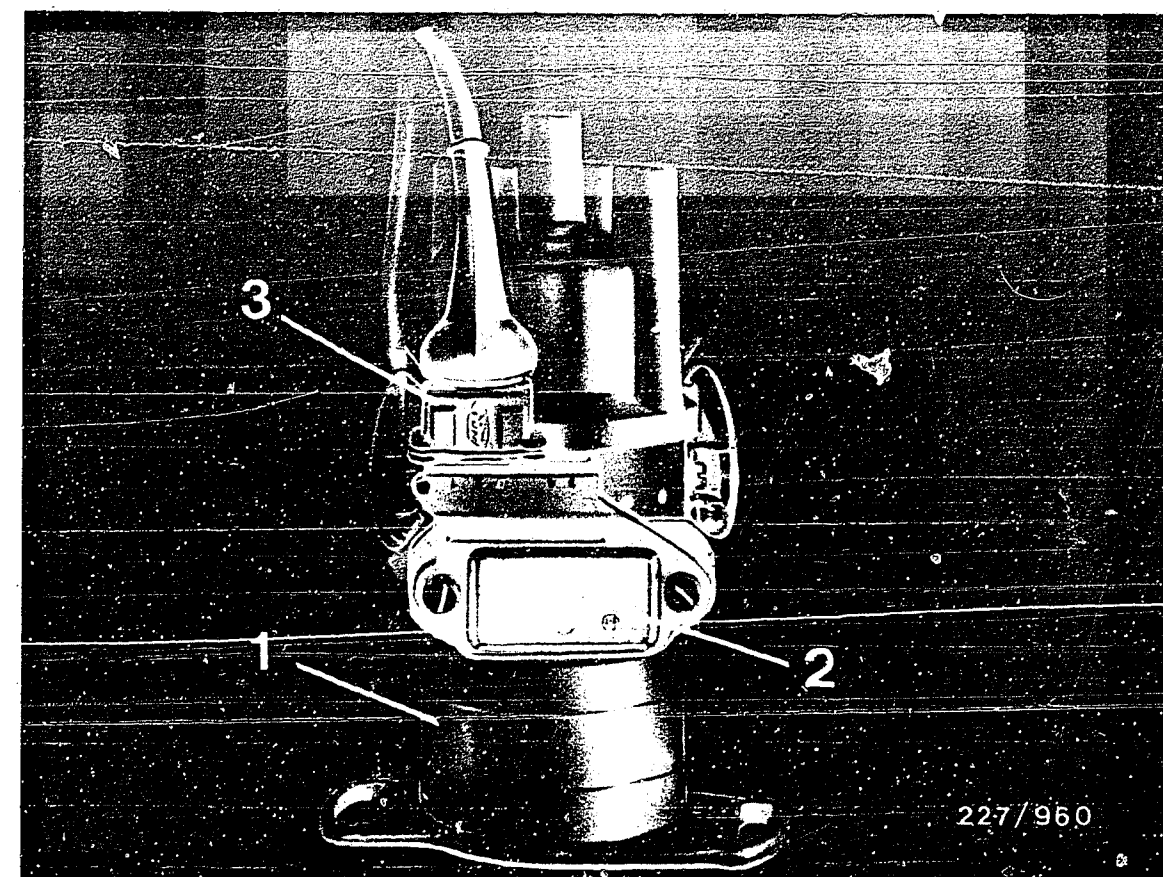
Voltmeter  
e.g. ETE 014.00 0 684 101 400

Heat-transfer compound 5 942 860 003

Test leads KDZS 0004  
and KDZS 0005  
(for correct connection of test  
equipment at connectors).

Test prods red 1 684 485 035  
black 1 684 485 034  
(for correct connection of test  
equipment at connectors).

Adapter lead green 1 684 448 115  
yellow 1 684 448 117  
(for correct connection of test  
equipment at ignition coil)



- 1 = Ignition distributor
- 2 = Trigger box
- 3 = Three-pin connector

## INSTALLATION POSITION OF COMPONENTS

To remove the trigger box, the ignition distributor must be removed from the engine.

After reinstallation, set ignition point, see Autodata test specifications.

The ignition coil is positioned on the left, as seen from forward direction of travel, next to the suspension-strut tower.

## HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts at Coordinate B3 and contains customer complaint (fault symptom) with several possible causes in each case (component faults) as well as coordinate references for detailed trouble-shooting. If no coordinate reference is given, it is a cause for which test instructions are not necessary.

Components which are tested via self-diagnosis or with universal test adapter are not listed in the trouble-shooting chart.

If the customer complaint has been clearly diagnosed, select the possible cause, one after the other and step by step, in the order given.

If the customer complaint has not been clearly diagnosed, check all the causes listed in the trouble-shooting chart. To prevent possible incorrect measurements, check all causes in the order given (because of the interlinking of test steps).

## Trouble-shooting (continued)

How to use the trouble-shooting program

The trouble-shooting program starting on Coordinate BB03 is divided into 3 rows of boxes.

The left-hand row contains test instructions and specifications.

The center row contains further test and repair instructions.

The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions in the left-hand row can be answered conclusively with "yes", then, after the end of the test step, return to the trouble-shooting chart on Coordinate BB03 or complete the test step as given in the Coordinates.

If the answer to the question is "no", branch to the center row and carry out the tests given there.

After the end of the test step, return to the trouble-shooting chart.

## Requirements for testing

Battery fully charged, fuel system O.K., engine mechanically O.K. (e.g. compression, valve clearance etc). Ambient temperature/temperature of ignition system 0° to 100°C (temperature has a considerable influence on measured values).

TROUBLE-SHOOTING CHART

- Customer complaint (fault symptoms)
1. Starting motor operates, engine fails to start or starts only with difficulty.

2. Engine starts but then dies.

3. Idle problems (engine speed, exhaust gas).

4. Poor throttle take-up, flat spot during acceleration.

5. Engine missing (ignition, mixture preparation).

6. Maximum engine power/top speed not reached.

7. Fuel consumption too high.

8. Engine running on/dieseling.

9. Engine knocking/pinging.

10. Engine overheating.

11. Fault lamp.

											Cause (component fault)	Coord.
*		*	*	*	*	*					High-voltage side	B05
*		*	*	*	*						Ignition coil	B07
*		*									Firing sequence	—
*											Voltage, trigger box	B09
*											Voltage, primary circuit	B11
*			*	*							Magnetic-pulse generator	B13
*											Contact resistances	B19
		*	*	*	*	*		*	*		Ignition timing	—
			*								Voltage, trigger box	B21
			*								Voltage, ignition coil	B23
			*								Primary voltage	B27
*											Output stage	B25
		*	*			*		*	*		Centrifugal advance	—
		*	*			*		*	*		Vacuum advance	—

For production reasons:  
continued on the following  
coordinate.

# TROUBLE-SHOOTING PROGRAM ( 1 )

↓

## Test HIGH-VOLTAGE SIDE:

Test spark plugs, spark-plug connectors, interference-suppression resistors, ignition cables, distributor cap, distributor rotor etc. for proper functioning (e.g. open circuits, shunt). Evaluate, for example, using ignition oscillogram, resistance measurement, and visual inspection.

Is the high-voltage side OK?

N>

Repair high-voltage side.

↓

Return to trouble-shooting chart B03

↓

B05

⇒

B06

⇐



## TROUBLE-SHOOTING PROGRAM ( 2 )

### Check IGNITION COIL.

Visual examination: remove protective cap from ignition coil and check whether plug (see picture) is in position and whether any sealing compound has escaped.

#### Electrical test:

Primary resistance at term.1 and term.15 (take resistance of test leads and test prods into account)

Secondary resistance at term.1 and term.4  
For resistance values, see brief instructions.

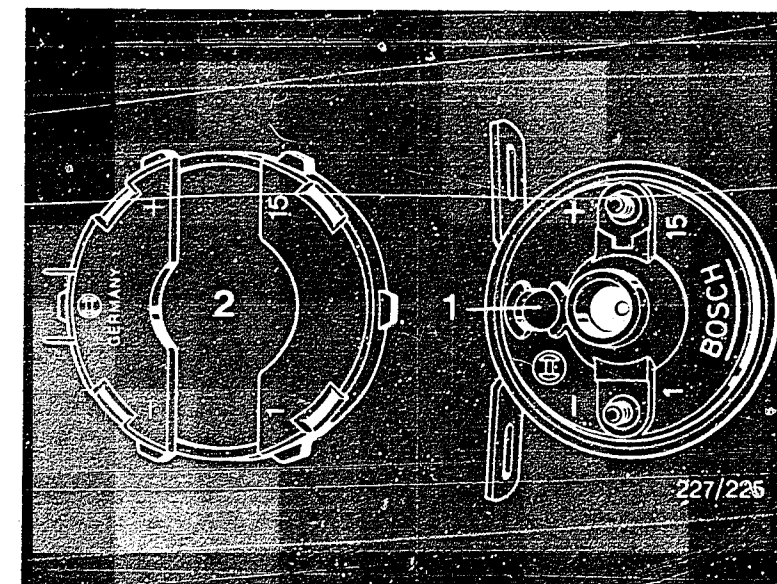
Plug in position and no sealing compound escaped?

Resistance values O.K.?

N>

1.If plug not in position and/or sealing compound escaped, replace ignition coil and trigger box.

2.If resistance values not O.K., replace ignition coil.



1 = Plug  
2 = Protective cap

Return to trouble-shooting chart  
B03

# TROUBLE-SHOOTING PROGRAM ( 3 )

V

Check TRIGGER-BOX POWER  
SUPPLY.

Disconnect trigger-box plug and  
connect voltmeter to term.3 (+)  
and term.2 (-).  
Switch on ignition.

Voltmeter must indicate battery  
voltage.

Voltage O.K.?

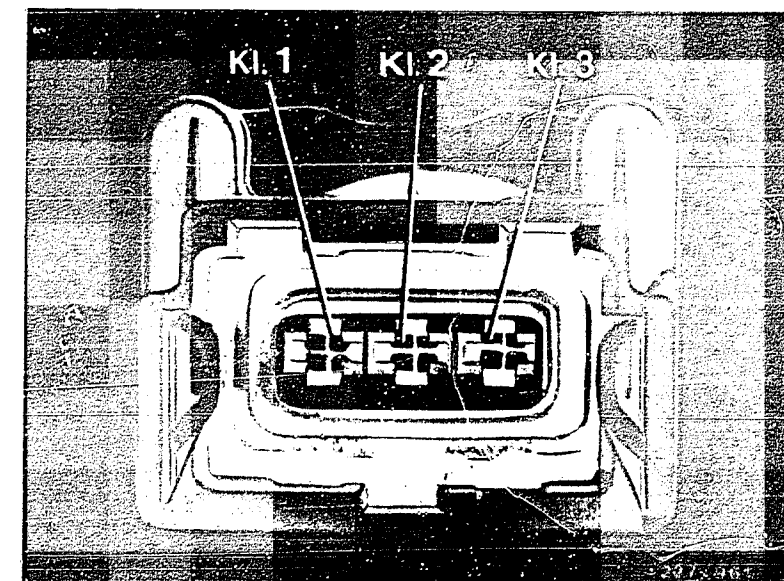
N>

Check for open circuit in leads  
and connections between ignition/  
starting switch and trigger-box  
plug term.3 as well as ground  
lead term.2.

Eliminate open circuit.

Y

Return to trouble-shooting chart  
B03



TROUBLE-SHOOTING PROGRAM ( 4 )

Check PRIMARY CIRCUIT.

Disconnect trigger-box plug and connect voltmeter to term.1 (+) and term.2 (-), see picture.

Switch on ignition.

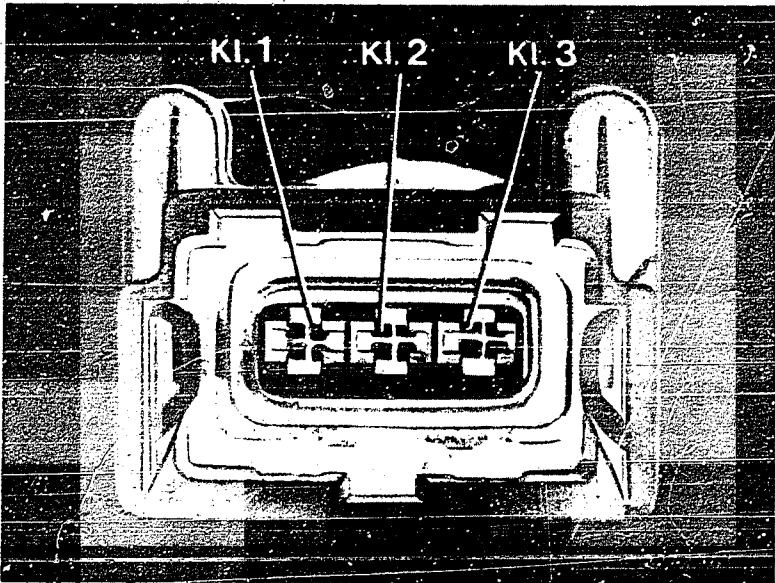
The voltmeter must indicate battery voltage.

Voltage O.K.?

N> Check for open circuit in lead between ignition/starting switch and ignition coil term.15, primary winding of ignition coil, in lead between ignition coil term.1 and trigger-box plug term.1 as well as in ground lead term.2.

Eliminate open circuit.

---

[illegible]

Return to trouble-shooting chart B03
---

TROUBLE-SHOOTING PROGRAM ( 5 )

V

Check MAGNETIC PULSE GENERATOR.

Visual examination: pulse-generator rotor must not brush against teeth of magnetic pulse generator.

Magnetic pulse generator O.K.?

N>

Replace magnetic pulse generator/  
ignition distributor.

Y

Continued on next picture page

B13

<==>

B14

<==>

TROUBLE-SHOOTING PROGRAM ( 5) CONTINUED ( 1)

Check MAGNETIC PULSE GENERATOR  
WINDING RESISTANCE.

N>

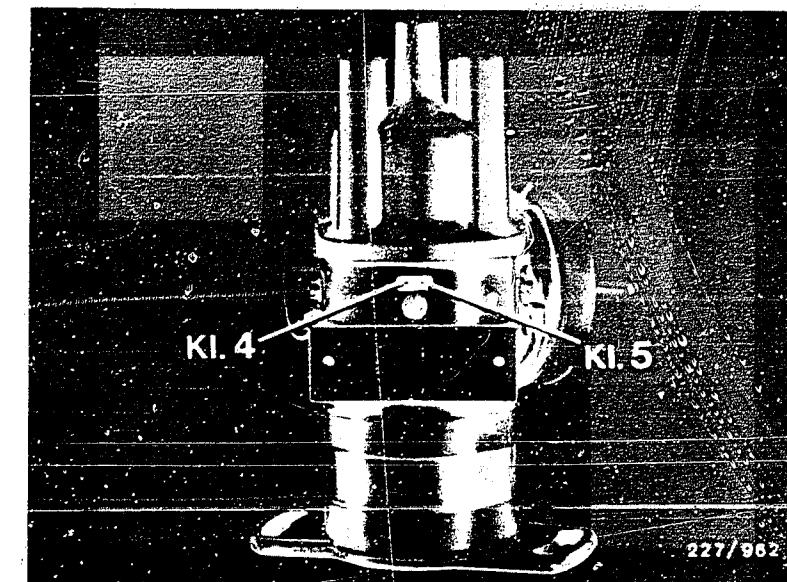
Replace magnetic pulse generator/  
ignition distributor.

Remove ignition distributor from  
engine, remove trigger box.

Connect ohmmeter with test prods  
to ignition-distributor plug-in  
connection term.4 and term.5,  
see top picture.

For specified resistance value,  
see brief instructions.

Resistance value O.K.?



Continued on next picture page

TROUBLE-SHOOTING PROGRAM ( 5 ) CONTINUED ( 2 )

V

Check MAGNETIC PULSE GENERATOR  
INSULATION RESISTANCE.

N>

Replace magnetic pulse generator/  
ignition distributor.

Connect ohmmeter with test prod  
to ignition-distributor plug-in  
connection term.4 or term.5 and  
ignition-distributor housing,  
see picture.

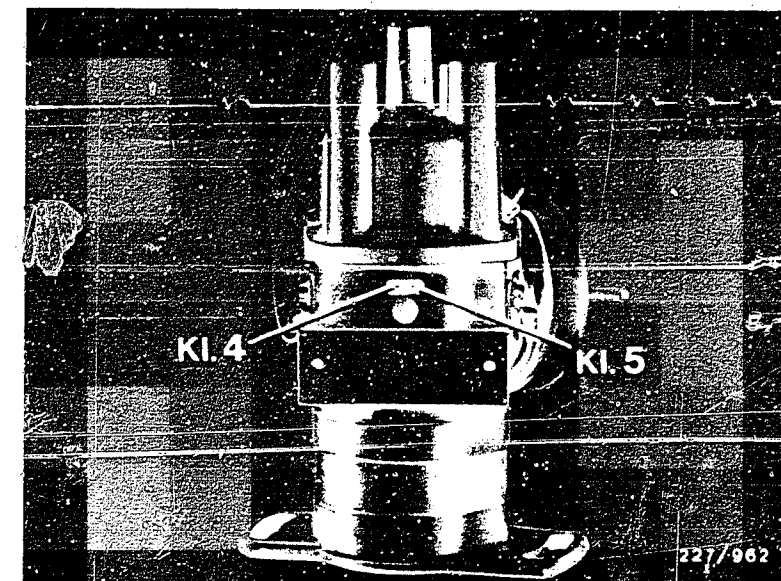
The ohmmeter must indicate  
infinity  $\Omega$

Resistance value O.K.?

Y

Return to trouble-shooting chart  
B03

V



# TROUBLE-SHOOTING PROGRAM ( 6 )

## Check CONTACT RESISTANCES.

Disconnect negative and positive leads from battery; disconnect trigger-box plug.  
Switch on ignition.

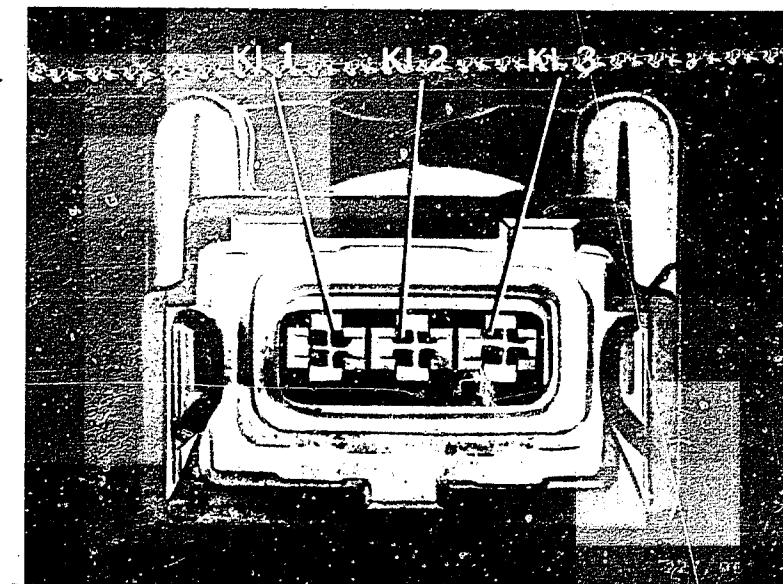
Check the following leads for contact resistance:

1. From negative battery terminal to trigger-box plug term.2
2. From positive battery terminal to trigger-box plug term.3
3. From positive battery terminal to ignition coil term.15
4. From ignition coil term.1 to trigger-box plug term.1

Contact resistance when checking Points 1, 2, 3 and 4 max. 0.3  $\Omega$   
(take resistance of test prods and test lead into account).

Resistance values when checking 1, 2, 3, and 4 O.K.?

Eliminate contact resistances.



Return to trouble-shooting chart  
B03

## TROUBLE-SHOOTING PROGRAM ( 7 )

V

Check TRIGGER-BOX POWER  
SUPPLY.

N>

Push back rubber sleeve on  
trigger-box plug. Connect volt-  
meter to trigger-box plug term.3  
(+) and term.2 (-), see top  
picture.

Operate engine at idle.

The voltage must be 12...14 V  
and must not be more than 1 V  
below battery voltage.

Voltage O.K.?

V

Return to trouble-shooting chart  
B03

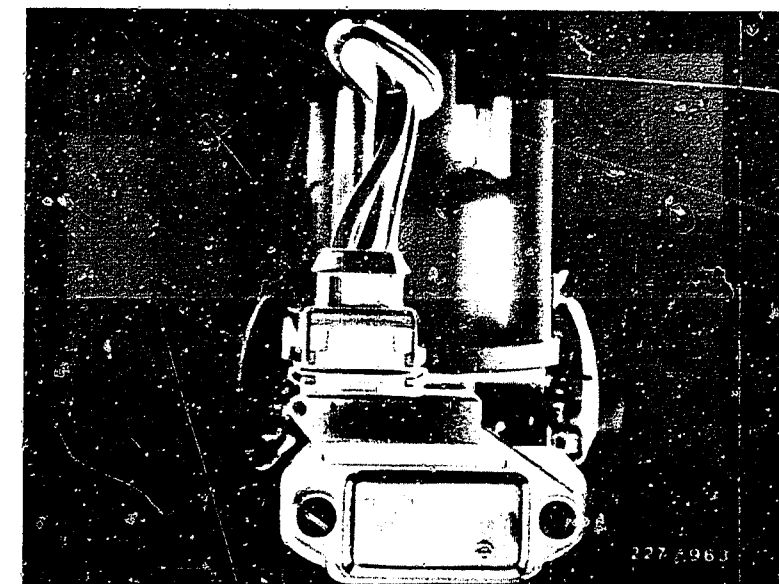
Disconnect positive and negative  
leads from battery; disconnect  
trigger-box plug.  
Switch on ignition.

Check the following leads for  
contact resistance:

1. From negative battery terminal  
to trigger-box plug term.2
2. From positive battery terminal  
to trigger-box plug term.3

Contact resistance when checking  
Points 1 and 2 max. 0.3  $\Omega$   
(take resistance of test prods  
and test lead into account).

Eliminate contact resistances.





# TROUBLE-SHOOTING PROGRAM ( 8 )

V

Check IGNITION-COIL POWER  
SUPPLY.

N>

Operate engine at idle.

Measure voltage at ignition  
coil term.15 and negative battery  
terminal. (Use adapter for  
ignition coil)

Voltage must be at least 10 V.

Voltage O.K.?

Y

Disconnect positive lead from  
battery; switch on ignition.

Check for contact resistance in  
leads between positive battery  
terminal and ignition coil  
term.15.

Contact resistance may be max.  
0.3  $\Omega$  (take resistance of test  
prods and test leads into  
account)

Eliminate contact resistance.

Return to trouble-shooting chart  
B03

TROUBLE-SHOOTING PROGRAM ( 9 )

V

Check OUTPUT STAGE.

Connect voltmeter to ignition  
coil term.1 and term.15. (Use  
adapter for ignition coil).  
Switch on ignition.  
The voltmeter must not indicate  
any deflection (0 V).  
Voltage (0 V) O.K.?

N>

Replace trigger box and  
ignition coil.

Y

Return to trouble-shooting chart  
B03

B25

<==>

B26

<==>

# TROUBLE-SHOOTING PROGRAM (10)

V

Check PRIMARY VOLTAGE  
(if MOT series available)

N>

Connect oscilloscope (e.g.  
MOT 201) together with pulse  
shaper 1 684 463 154 to ignition  
coil according to operating  
instructions.

Note: incorrect reading without  
pulse shaper.

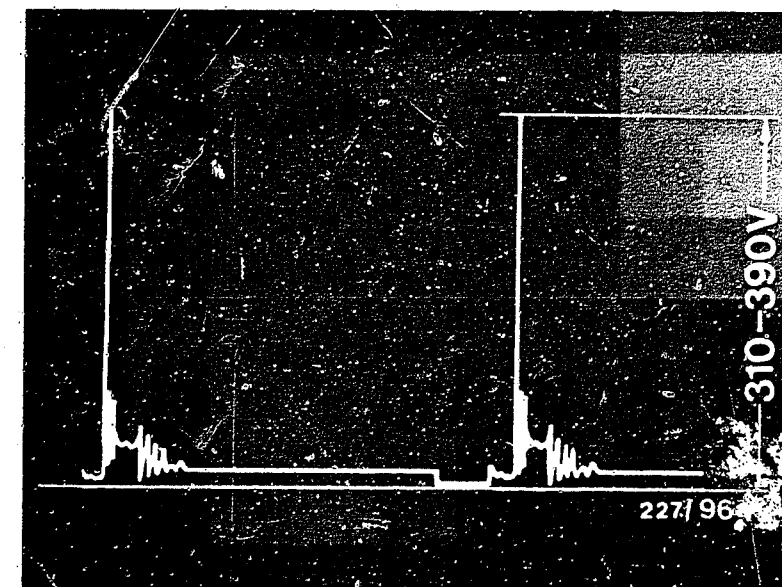
See brief instructions for  
primary-voltage set value.

Primary voltage O.K.?

Y

Return to trouble-shooting chart  
B03.

Replace trigger box.



# TECHNICAL BULLETIN

DANGER OF ACCIDENT ON SEMI-  
CONDUCTOR IGNITION SYSTEMS

|22|  
VDT-I-227/102 En  
03.1981

Supersedes Feb. 3, 1976 edition

Please be sure to pass this bulletin  
together with VDE 0104/7.67 enclosed on to your  
employees for their attention.

The increased demands made on their ignition  
systems by modern engines, and the wish for freedom  
from maintenance, led some time ago to manufacturers  
starting to equip their vehicles with semi-conductor  
ignition systems as original equipment.

In most cases, the performance of nearly all  
makes of such systems is higher than that of  
conventional systems, and further improvements are  
to be expected. This means that semi-conductor  
ignition systems have reached the point where  
contact with "live" components or terminals  
(whether on the primary side or the secondary side)  
can prove fatal.

In this connection, we should like to point out  
to you that the laws valid in your country  
regarding work on high-voltage systems must  
be adhered to when working on, or testing,  
semi-conductor ignition systems.

As a matter of principle, when working on such  
ignition systems, the ignition is to be  
switched off.

Included in such work are the following operations:

- \* Connection of engine testing equipment  
(timing strobe, dwell-tach tester, ignition  
oscilloscope etc.)
- \* Replacement of ignition system components  
(spark plugs, ignition coil, ignition  
distributor, H.T. ignition cables etc.)

If it is necessary to switch on the ignition  
in order to test the system or make adjustments  
on the engine (to the carburetor, for instance),  
then lethal voltages are present throughout  
the entire system.

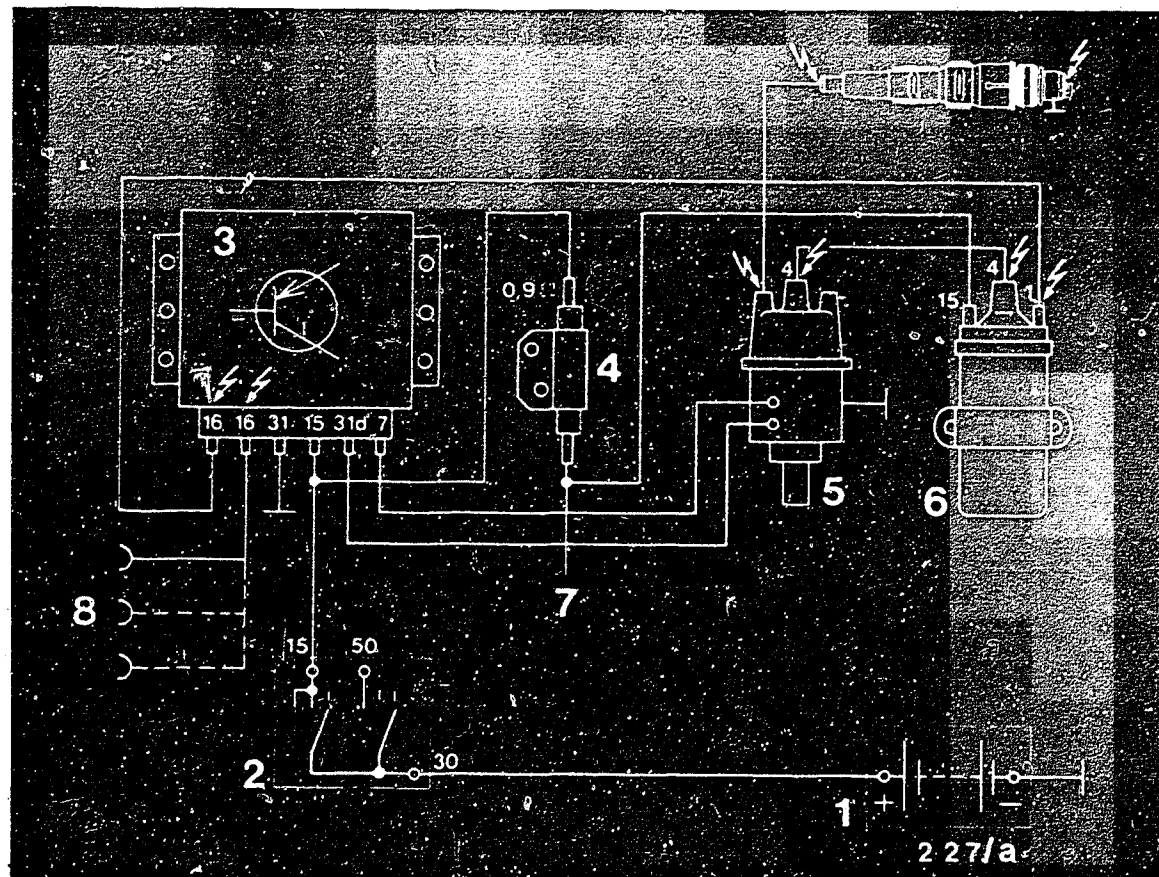
This means that the danger of accident exists  
not only at the individual components in the  
system (e.g. ignition distributor, ignition  
coil, trigger box, ignition harness), but also  
at the wiring harness (e.g. connection for the  
tachometer, diagnostic connector), on terminals,  
and on test equipment.

In addition, in the case of the capacitor-discharge  
ignition system (CDI), danger of accident is also  
present under the following circumstances:

- \* Operation of the trigger box without the  
ignition transformer.
- \* At the trigger box, (removed), relatively  
soon after it has been switched off  
(capacitor discharge).

Below is a typical terminal diagram of a semi-  
conductor ignition system, the dangerous  
locations being marked with high-voltage arrows.

We would point out that all semi-conductor  
ignition systems, even the older versions, are  
to be regarded as dangerous in the sense as  
defined by this bulletin.



- 1 = Battery
- 2 = Ignition lock
- 3 = Trigger box
- 4 = Resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor term. 16
- 8 = To tachometer connection  
or diagnostic plug  
or TD connection

Published by:

Robert Bosch GmbH  
Division KH  
After-Sales Service Department for  
Training and Technology (KH/VSK)

Please direct questions and comments  
concerning the contents to our authorized  
representative in your country.

# BREAKERLESS TRANSISTORIZED IGNITION SYSTEM

Warranty note

|22|  
VDT-I-227/103 En

Hybrid-construction trigger boxes

0 227 100 100 for ignition dist. with Hall gen. (TCI-h)

0 227 100 102 for ig. dist. with ind.-type pulse gen. (TCI-i)

## Warranty procedure

If the complaints are justified, all these  
hybrid trigger boxes are to be sent, along with  
completed warranty documents, to your authorized  
representative for forwarding to the following address:

ROBERT BOSCH GMBH  
KH/LAV - Auspackraum  
zur Weiterleitung an K1/VAK 21  
D-7000 Stuttgart 30

This instruction remains valid until further instruction.



Apart from the well-known TCI trigger boxes 0 227 100 0.., trigger boxes of hybrid construction have been fitted as standard since 9.78 (upper illustration).

Published by:

ROBERT BOSCH GMBH  
Division KH  
Technical After-Sales Service (KH/VKD)

Please direct questions and comments concerning the contents to our authorized representative in your country.

## TECHNICAL BULLETIN

### EFFECTS OF ELECTRICAL AND ELECTRONIC SYSTEMS ON HEART PACEMAKERS

VDT-I-227/107 En  
01.1981

e.g. Ignition systems, Jetronic, Motronic, ABS

Please ensure that this Bulletin is passed on to your employees for their attention.

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinische Technik" (5/80) published the results.

The most important discoveries in this practice can be summarized from the examination report as follows:

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.
2. With a stationary engine and the ignition switched off, the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.

3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency). Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.

4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers, please introduce the necessary measures.

We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.

Published by:

Robert Bosch GmbH  
Division KH  
After-Sales Service Department for  
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country.

# TECHNICAL BULLETIN

## NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En  
01.1983

**Supersedes 5.1981 edition**

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbreviated code	Meaning	Switching	Ignition ctrl. and spark adv.	High-voltage dist.
Coil ignition	ZS (CI)		Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I * (TCI-i)	I=Induction-type pulse gen.	Electronic (trigger box)	Mechanical (ignition dist.)	Mechanical (ignition dist.)
	TSZ-H (TCI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition dist.)	Mechanical (ignition dist.)

Published by:

Robert Bosch GmbH  
Division KH  
After-Sales Service Department for  
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country.



## MOTOR VEHICLE SERVICE INFORMATION

INCORRECT DISPLAY OF ROTATIONAL SPEED VDT-I-Gen. 030 En  
AND DWELL ANGLE ONLY WITH TRIGGER 02.1981  
BOXES 0 227 100 .. (TCI-i, TCI-h)  
WITH CURRENT LIMITATION Supersedes ed. 6.1980

For additional information, see VDT-I Gen. 032 En

### 1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period, the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT 001.00	Rotational-speed	KTE 001.00
001.01	display O.K. with	001.02
001.02	these testers	001.03
001.04		
002.00		

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan	(Hitachi ignition system)
Fiat	(Delco ignition system)	Datsun	(Bosch ignition system)
Ford	(Delco ignition system)	Peugeot	(Bosch ignition system)
General Motors	(HEI ignition system)	VW	(Bosch/Fairchild ignition system)
		Bosch	transistorized ignition system for retrofitting
		0 227 100 920	

## 2. Test instructions

### 2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min<sup>-1</sup> to 1200 min<sup>-1</sup>).

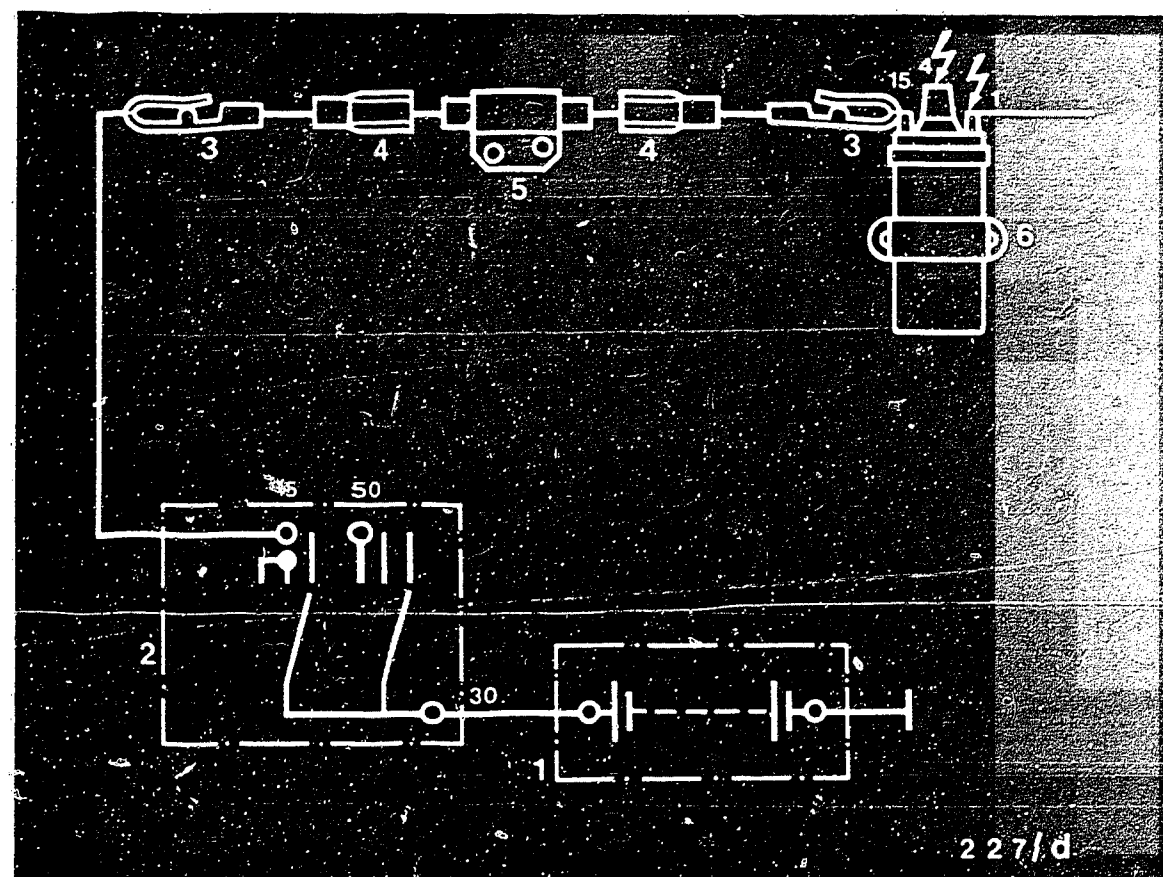
It is, however, possible to attain correct rotational-speed measurements:

Connect a ballast resistor of 0.9 or 1.0 Ohms (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

### Suggestion for user manufacture

#### Required parts:

1 ballast resistor 0.9 Ohms	Part no. 0 227 900 002
or	
1 ballast resistor 1.0 Ohms	Part no. 0 227 900 101
2 blade receptacles e.g. approx. 0.2 m cable, 1.5 mm <sup>2</sup> e.g.	Part no. 1 901 355 881 Part no. 6 210 150 150
2 insulated clips	Commercially available



- |                     |                      |
|---------------------|----------------------|
| 1 = Battery         | 4 = Blade receptacle |
| 2 = Ignition switch | 5 = Ballast resistor |
| 3 = Clips           | 6 = Ignition coil    |

High-voltage arrow: Dangerous voltages  
(400 V - 25 kV)

## 2.2 Dwell angle

The dwell angle is electronically controlled.  
A measurement of the dwell angle is no longer performed.

## 2.3 Ignition point

Is displayed correctly. Connect tester as per operating instructions.

Published by:

Robert Bosch GmbH

Division KH

After-Sales Service Department for

Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country.

# MOTOR VEHICLE SERVICE INFORMATION

## MOTORTESTER CONVERSION

VDT-I-Gen. 032 En

Incorrect display of rotational speed,  
dwell angle and ignition point  
only with trigger boxes

06.1980

0 227 100 .. (TCI-1, TCI-h) with current limitation

For additional information, see

VDT-I-Gen. 030 of 6.80

Re.: Motortesters EFAW 268

268 S 10

269

214 B

AE 2000

## 1. General

Please make sure that the above-mentioned motortesters in your workshop and at your customers (e.g. motor-vehicle workshops, oil companies, gas stations, vocational schools etc.) are converted. The conversion is subject to payment and is carried out by the K7 after-sales service of the responsible BG. The standard time is 15 work units (with fitting of switch).

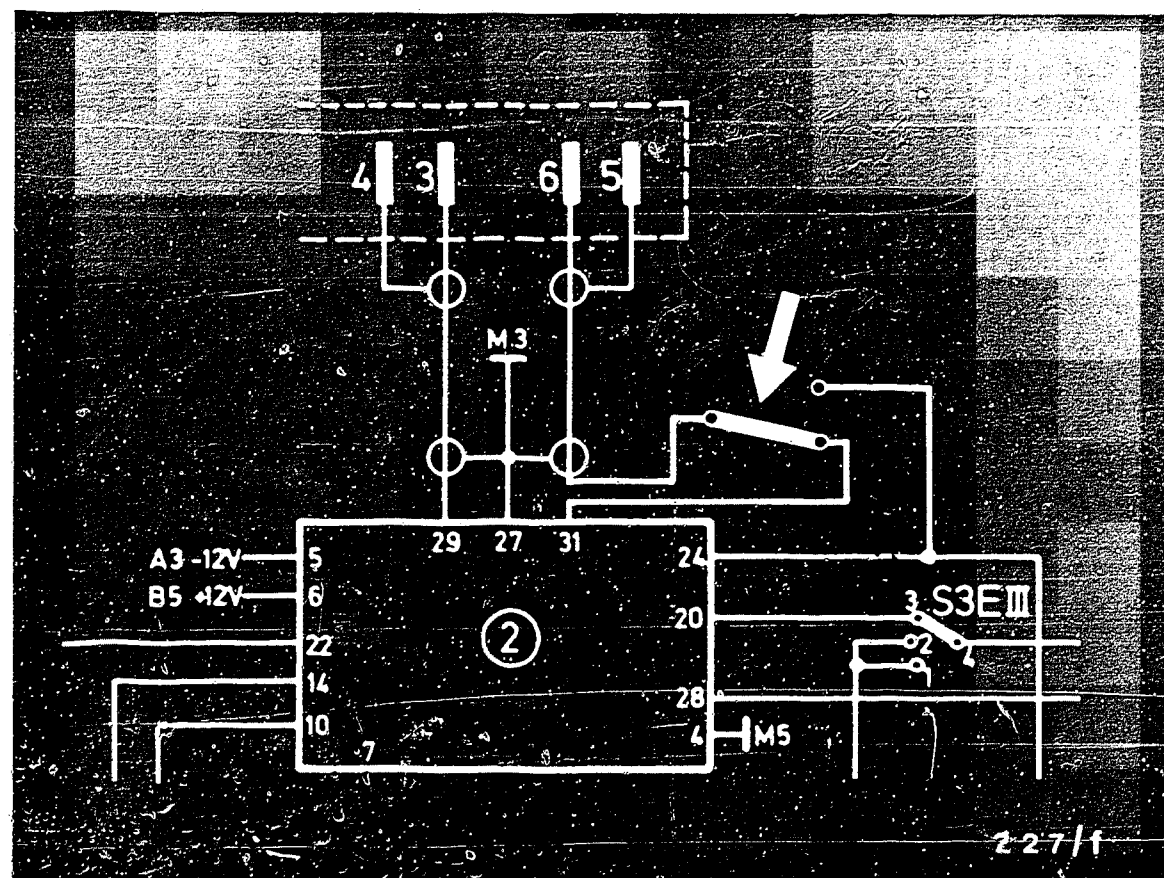
## 2. Why motortester conversion?

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period, the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle as well as to incorrect triggering of the meter when testing the ignition system.

### 3. Conversion measures

In addition, a new line must be connected from pin 31 of printed board 11 to the other contact of the switch with change-over contact.

Arrow points to switch with change-over contact.



(Extract from WJF 503/1, Page 64))

#### EFAW 214 B

Remove the line from terminal 6 of printed board 16 to pin 31 of printed board 2 (coupling stage) and connect to pin 24 of the same printed board via a switch with change-over contact (e.g. 0 341 500 803).

In addition, a new line must be connected from pin 31 of printed board 2 to the other contact of the switch with change-over contact.

Arrow points to switch with change-over contact.

By fitting the switch with change-over contact in the front panel of the motortester, it is possible to switch over from standard ignition systems to those with current limitation. We recommend that the switch positions be marked correspondingly:

e.g. "Standard" - "Current limitation".

These conversion measures have already been published in the K7 information sheet KJF 28/7911.

#### 4. Test instructions

##### 4.1 Standard ignition systems

Switch position: "Standard".

All other tester connections as per operating instructions.

##### 4.2 Ignition systems with current limitation

Switch position: "Current limitation".

In order to trigger the timing strobe, the induction-type pulse generator (clamp-on pickup or red pickup) must always be connected during the measurement.

The selector switch for ignition systems built into the motortester must be switched to standard coil ignition (not to TCI) with these ignition systems.

All other tester connections as per operating instructions.

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

Published by:

Robert Bosch GmbH  
Division KH  
After-Sales Service Department for  
Training and Technology (KH/VSK)

Please direct questions and comments concerning the contents to our authorized representative in your country.

TESTS ON ELECTRONIC IGNITION  
SYSTEMS (TCI, TI)  
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En  
03.1981

The following tests are listed in older  
and current Tester operating instructions  
or in "Trouble-shooting with the oscilloscope":

- \* "Separate ignition coil test"  
(Concerns EFAW 213, 214, 268, AE 2000)
- \* Calculating the "ignition voltage reserve"  
(Concerns EFAW 213, 214, 268, AE 2000  
and MOT series).
- \* "Intensified insulation test"  
(Concerns EFAW 213, 214, 268, AE 2000  
and MOT series).

Nowadays, transistorized ignition systems  
deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition  
cable and ignition distributor by voltage  
flashovers, the tests listed above should  
n o t be carried out on transistorized  
ignition systems.

The contents of this Service Information has  
already been published in the K7 Information  
K7-VJF 17/8012.

Published by:  
Robert Bosch GmbH  
Division KH  
After-Sales Service Department for  
Training and Technology (KH/VSK)  
Please direct questions and comments  
concerning the contents to our authorized  
representative in your country.

For production reasons:  
continued on the following  
coordinate.

# INDEX

## Coordinates

High-voltage side	B05
Primary voltage	B27
Trigger-box power supply	B09
Trigger-box power supply	B21
Primary-circuit power supply	B11
Ignition-coil power supply	B23
Contact resistances	B19
Ignition coil	B07
Magnetic pulse generator	B13

For production reasons:  
continued on the following  
coordinate.

# TABLE OF CONTENTS

Section	Coordinates
How to use the microcard.....	A02
Special features.....	A02
Safety and precautionary measures.....	A03
Necessary test equipment and auxiliaries.....	A09
Installation position of components.....	A10
How to use trouble-shooting chart and trouble-shooting program.....	B01
Trouble-shooting program.....	B03
High-voltage side.....	B05
Magnetic coil.....	B07
Trigger-box power supply.....	B09
Primary circuit.....	B11
Magnetic pulse generator.....	B13
Contact resistances.....	B19
Trigger-box power supply with engine idling.....	B21
Ignition-coil power supply.....	B23
Output stage.....	B25
Primary voltage.....	B27
Technical Bulletins.....	N01
Index.....	N25

## IMPRESSUM

(c) 1987 Robert Bosch GmbH  
 Automotive Equipment - After-Sales Service  
 Department for Technical Publications KH/VDT  
 Postfach 50, D-7000 Stuttgart 1.  
 Published by: After-Sales Service  
 Department for Training and Technology  
 (KH/VSK). Press date: 05.1987.  
 Please direct questions and comments  
 concerning the contents to our authorized  
 representative in your country.  
 This publication is intended only for the  
 BOSCH After-Sales Service Organization, and  
 may not be passed on to third parties  
 without our consent.  
 Microfilmed in the Federal Republic of Ger-  
 many. Microphotographie en République Fédé-  
 rale d'Allemagne.